

REMARKS

1. Claims 1-95 are pending in the application. Claims 1-36 and 47-95 have been withdrawn by the Examiner from further consideration. Claims 37-46 are rejected under 35 U.S.C. § 102(e) and under 35 U.S.C. § 103(a). Applicants are unable to find a specific rejection of Claim 41. In addition, certain of the drawings are objected to. Clearer drawings have been made of Figs. 25, 27e, 28 and 31, which are submitted herewith. The Examiner is requested to enter the replacement pages and to withdraw the objection to the drawings. No new matter was added in amending the drawings.

2. Claims 42, 44 and 46 are rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Pat. No. 6,339,667 to Young-Hui Song et al. ("Song"). The rejection cites Song, Fig. 2 and text at col. 3, lines 23-47, as anticipating these claims. Song describes only a 3-layered structure, a substrate 210, a lower clad layer 220, and a core layer 230 deposited over the lower clad layer 220. See Song, col. 2, lines 23-27, and Fig. 2. Song describes no layer above core layer 230.

By contrast, Claims 42 and 46 include further limitations of an upper waveguide cladding disposed on the waveguide core. The upper waveguide cladding is described as having a definite thickness and a refractive index. See Specification, p. 23, line 33, to p. 34, line 5. The upper waveguide cladding is further described as being made of silica-titania ($\text{SiO}_2\text{-TiO}_2$) material mixture or of silicon nitride (Si_3N_4) to achieve a refractive index of 1.7. See specification, p. 25, lines 1-3. While these limitations need not be imported into the claims, Claim 42 does specifically claim an upper waveguide cladding, and defines at least these two examples of an upper waveguide cladding that is not "air or any layer above core." In order to anticipate, a reference must teach or describe all the limitations of the claimed invention, which Song does not.

Accordingly, Song does not describe or teach these limitations of Claims 42 and 46, which are therefore not anticipated and are allowable. Claim 44 depends from Claim 42 and is also allowable.

3. Claims 37, 38 and 40 are rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Pat. No. 6,690,871 to Kevin Lee et al. ("Lee"). The rejection cites Lee, Figs. 1 and 3 and text at col. 2, lines 8-34 and 49-63, as anticipating these claims. As admitted in the rejection under 35 U.S.C. § 103(a), Lee teaches a waveguide core that has a graded index layer "that creates a gradual refractive index grading up to the cladding/core interface." Office Action, p. 5, lines 12-13,

Lee describes a graded index layer 103 between the core 101 and the cladding 102, wherein the index of the graded index layer varies from the high index core (on the bottom) to the low index cladding (on the top). See Lee, col. 2, lines 55-58. Graded index layer 103 has an index on its bottom that is the same as the high index core 101, and varies to the low index cladding 102.

Claim 37, by contrast, claims a waveguide core having a refractive index that is at a maximum at its center. Claim 37 recites "a waveguide core having a center and an outer border," "the waveguide core having a refractive index . . . that . . . "gradually decreases from a maximum effective refractive index at the center of the core to a minimum effective refractive index at the outer border" in the direction of the y-coordinate (emphasis added). That is, Claim 37 is for a "center maximum" refractive index, while Lee has a graded index with its maximum on one side (the bottom), not at the center. Therefore, Lee does not describe at least this limitation of Claim 37.

The same argument applies to Claims 38 and 40, these claims including the same limitation of a waveguide core having a refractive index that has "a maximum effective refractive index at the center of the core" and a minimum effective refractive index at the outer border (emphasis added). Claim 40 has additional limitations that are not addressed in the rejection, including a first minimum refractive index, a second refractive index distribution graded in a direction transverse to the first direction, and so on. Claims 37, 38, and 40 are allowable over Lee because Lee does not teach or describe all the limitations of the claims.

4. Claims 39, 43, and 45 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Pat. No. 6,690,871 to Kevin Lee et al. ("Lee"). The rejection

cites Lee, Figs. 1 and 3, and text at col. 2, lines 8-34, and lines 49-63, as anticipating these claims. As discussed above, and as admitted in the rejection, Lee describes a graded index layer 103 between the core 101 and the cladding 102, wherein the index of the graded index layer varies from the high index core (on the bottom) to the low index cladding (on the top). See Lee, col. 2, lines 55-58. Thus, graded index layer 103 has an index on its bottom that is the same as the high index core 101, and varies to the low index cladding 102.

Per the arguments given above under the discussion for 35 U.S.C. § 102(e), Lee does not anticipate Claim 37. Claim 39 depends from Claim 37 and Claim 39 includes all the limitations of Claim 37. There is no suggestion in the rejection that the "center maximum" limitation of Claim 37 would be obvious to one having skill in the art. Therefore, at least this limitation of Claim 39, depending from Claim 37, is not described or suggested in Lee. Therefore, Claim 39 is allowable over the Lee.

Claim 43 depends from Claim 42, which was not rejected in view of Lee. Claim 43 includes the same "center maximum" refractive index limitation discussed above for the 35 U.S.C. § 102(e) rejections and for Claim 39. By the same arguments, Claim 43 is allowable because Lee does not describe or suggest a graded refractive index having a maximum at the center. The rejection does not mention this limitation, and there is no suggestion in the rejection that the "center maximum" limitation of Claim 43 would be obvious to one having skill in the art. Therefore, at least this limitation of Claim 43 is not described or suggested in Lee. Therefore, Claim 43 is allowable over the Lee.

Claim 45 is an independent claim, including a limitation of a waveguide core having refractive index graded in the x-coordinate direction, in which the refractive index "gradually decreases from a maximum effective refractive index at the center of the core to a minimum effective refractive index at the outer border." This "center maximum" limitation is again not described or suggested in Lee, and is not addressed in the rejection. Accordingly, Lee does not describe or suggest all the limitations of the claim, which is therefore allowable over Lee. The Examiner is respectfully requested to withdraw the rejection of Claims 39, 43, and 45 under 35 U.S.C. § 103(a) in view of Lee.

5. Applicant submits that the references do not anticipate or render unpatentable the inventions of Claims 37-46. Applicant respectfully requests the Examiner to enter the amendment, four pages of replacement drawings, and to withdraw the rejections and to advance the claims to allowance. The Examiner is invited to contact the undersigned attorney for the Applicant via telephone if such communication would expedite this application or would be helpful to the Examiner.

Respectfully submitted,



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APPENDIX A